

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



Amateur Satellite Report is endorsed by the American Radio Relay League as the special interest Newsletter serving the Amateur Radio Satellite Community

Number 80
June 18, 1984

Editor: Vern Riportella, WA2LQQ
Contr. Editor: George Johnson, W0MD
Harold Winard, KB2M
Managing Editor: Bob Myers, W1XT
Copyright 1984 by Amateur Satellite Report
(See last page for details)

AO-10 Approaches First Birthday

Last Saturday, 16 June, marked the first anniversary of the launch of Phase IIIB, now known as AMSAT-OSCAR 10. The condition of the spacecraft is generally described as excellent. No serious problems have manifested since 30 Sept. 1983 when a watchdog thermal monitor unexpectedly shut down the Mode B transponder. (See ASR #64.) This problem turned out to be minor; merely a refinement of a temperature trip point in software was all that was required.

Mode L performance is down due to a bias regulator failure. Despite this, activity levels are showing a slow, steady growth. Mode L users now approximate 100 according to a tally by K0RZ. Mode B users are not easily determinable but ASR has heard estimates of 2,000 to 5,000 occasional and regular users worldwide discussed. Early fears of congestion on Mode B appear to have been unwarranted.



Nick, W8CA, adjusting his 9-turn helix that gives such excellent performance on AMSAT-OSCAR 10.

On 9 May the argument of perigee passed 270 degrees. On that date, therefore, the latitude of apogee equalled the orbital inclination, 25.62 degrees. Prior to 9 May the latitude of apogee had been progressing north since launch. After 9 May the latitude of apogee will move slowly south again. According to the *Satellite Experimenters' Handbook* (available from AMSAT) the rate of change of argument of perigee is 0.277 degrees per day. That means that 325 days after 9 May (when argument of perigee was 270 degrees) the apogee will occur over the equator (when argument of perigee equals 360 degrees). That will occur on about 29 Mar. 1985. The latitude of apogee will continue moving south for another 325 days until on approximately 17 Feb. 1986 when it will reach its maximum southern latitude of 25.62 degrees. At that time the Southern Hemisphere will enjoy the visibility advantage of having apogee occur deep in one's own hemisphere.

Potentially one of the most popular uses of AO-10 will be gateway access by minimally equipped amateurs. Gateway stations are also a possible conduit for essential emergency communications for long-haul traffic as well as regional coverage. Interest in gateway access is beginning to blossom.

The first operating event on AO-10, the AMSAT-Stoner 25th Anniversary Challenge Cup competition was begun on 15 April. Hundreds of competitors have racked up thousands of QSOs apparently without disrupting other satellite users and perhaps demonstrating how low-keyed competitive events can co-exist with other diversions in the satellite context.

With perhaps another 5 years of productive life ahead, one can only imagine the return on investment that lies ahead for amateurs. And you know, it's kind of hard to imagine a ham radio world without AO-10 up there percolating. It's downright comforting. On this first anniversary then, let us ponder at how far we have come; how things used to be when a quick 15 minute pass was gone before one realized it and Phase III was just a dream of the future. Not only has the future arrived...but it's now aged one!

More remarkable yet, with barely its first birthday passed, the outlines of AO-10's successors are now visible...some plain...some fuzzy...PACSAT...JAS-1...ARSENÉ...and the ultimate system, Phase IV is lurking, tantalizingly perceived through filaments of future's fog to test the ar-

chitects' grasp of real and might-be paths to the future of amateur satellites.

HAPPY BIRTHDAY AMSAT-OSCAR 10 from all the world's amateurs!!!!

UoSAT Team Says Bird Now Under Full Control

Following a harrowing 10 weeks when the silence of space permeated the receivers of earthbound observers listening for the beacons of UoSAT-OSCAR 11 to return, the powerful 2 meter beacon was successfully commanded on 14 May. Now, in a further dramatic breakthrough, University of Surrey UoSAT program officials report the bird is under full control. The announcement from Surrey ascribes the malfunction to a few components in the VHF command receiver. According to G3YJO at Surrey, the breakthrough came on 6 June. This follows by one day the first successful exercise of the Digital Communications Experiment, DCE. We quote the following UoSAT Bulletin for summary and details.

UoSAT-OSCAR 11 Spacecraft Operational Status
Dr. M.N. Sweeting, University of Surrey, UK. 1200 gmt
7th June 1984

The UoSAT Team at the University of Surrey successfully re-established command over the UoSAT-2 spacecraft at 2135 gmt 6th June on orbit 1418 using the hitherto inoperative VHF command uplink.

Following a successful launch by NASA on 1st March, UoSAT-2 performed perfectly for the first orbits, switched off the 145 MHz downlink under computer control as instructed and then refused to respond to ground commands. A lengthy series of tests to attempt to home in on the nature of the spacecraft's problem were undertaken over a period of 10 weeks — culminating in the successful reception and tracking of the known very low level microwatt signal which is continuously radiated from the microwave receivers on the spacecraft. This breakthrough, by an outstation of SRI International in Greenland, [on 11 May] confirmed, for the first time after UoSAT-2 fell silent, that the spacecraft primary power systems were functioning and that the Surrey ground-station was indeed tracking the spacecraft accurately.

[On 14 May] on orbit 1076 the Surrey command station succeeded, with difficulty, in switching the 145 MHz transmitter back on using the UHF command uplink. The data subsequently transmitted from the spacecraft allowed the command team to proceed with cautious diagnostic routines to attempt to pinpoint the cause of the problem. After four weeks of exhaustive and painfully slow tests and analyses, the problem has been identified and isolated to a small area of circuitry — about 5 components — that directs command data received by the spacecraft from the VHF uplink to the command decoder. This crucial circuit has triple redundancy, one for each of the three command receivers, and the same fault has not yet occurred on the other circuits. In keeping with the design philosophy of 'redundancy through different technologies', there are also two routes whereby this area of circuit can be bypassed using either the primary spacecraft (1802) computer or the Digital Communications Experiment (DCE).

Once the problem had been fully understood, the DCE was programmed — using the UHF uplink — to provide a 'bypass' around the fault and, when activated on orbit 1418, restored the VHF uplink back to full capacity. The DCE was chosen to do this task firstly as it would leave the primary spacecraft computer free to concentrate on the complex navigation and attitude control & stabilisation tasks now imminent, and secondly as the DCE requires a shorter 'start-up' sequence transmitted to get it going! The final configuration will depend on operational requirements and the bypass may be provided by either or both computers.

Initial results indicate that the VHF/UHF antennas, antenna feeds, hybrid and duplexers are all performing [well] supporting low error-rate full duplex operations at 145 MHz. The current unfavourable attitude of the spacecraft gives rise to a marginal UHF uplink due to antenna directivity — aggravated by low temperature. This should improve if the spacecraft becomes earth-pointing following attitude control manoeuvres and stabilisation.

In the immediate future, UoSAT-2 operations will entail a checkout of the spacecraft functions; detailed navigation analyses and attitude manoeuvres to prepare for gravity gradient stabilisation before the various experiments can be activated on a regular basis.

In a demonstration of the flexible design of the spacecraft, the UoSAT-2 mission has been revitalised. The result is that we are now back to where we were on orbit 3 after launch and we have to proceed with the commissioning of the spacecraft and its experiments. We do not yet know whether there are any other 'gremlins' in the spacecraft nor what the operational implications of the use of the on-board computers for the 'bypass' will be on the planned experiments.

The UoSAT Team would like to thank all those who have given support through the dark passages of the last months and particularly to Bob Leonard and his team at SRI International and to Harold Price (AMSAT/VITA) for providing the necessary software for the DCE at short notice — transferred from California by electronic mail! — *Martin Sweeting [G3YJO], UoSAT Programme Manager*

Call For Nominations

AMSAT Headquarters announces that nominations for the office of Director are now in order. The seats of three of the Directors (W3IWI, JA1ANG and G3IOR) are up for election in this cycle. Last Autumn VE2VQ, W3GEY, W6SP and W6XN were elected. The term of office is two years.

An AMSAT member who agrees to serve can be nominated by any five current AMSAT members or by an AMSAT Member Society. Nominating petitions may be sent to: AMSAT, 850 Sligo Ave., #601, Silver Spring, MD 20910. Petitions must arrive not later than 31 July.

Nominees will be requested to provide minimal background/biographical data which will be published with the ballots. ASR will publish the platform statements of the nominees again this year. Equal space will be made available to all nominees and the statements will be published in random sequence subject to arrival date at AMSAT HQ.

The election will take place at a date to be determined in the next few weeks when the time/place of the Annual General Meeting is established. Dates in October and November are presently being considered.

This year marks the first time serious consideration is being given to beginning the practice of rotating the place of the Annual General Meeting from year to year. A prime candidate for this year is Los Angeles and initial feasibility studies performed to date indicate many of the necessary elements are at hand.

Consideration is also being given to the proposition of holding the Annual General Meeting in conjunction with a Space Symposium (as was done at the Applied Physics Laboratory in 1983) and then to follow that on a Monday and Tuesday with the annual Board of Directors' Meeting.

K2ZRO Commemorated With OSCAR Station

The memory of Kaz Deskur, K2ZRO, was enshrined last weekend with the dedication of the K. Deskur Satellite Radio station at the Roberson Kopernik Observatory near Binghamton, N.Y. The 16 June ceremonies were held to celebrate the 10th anniversary of the observatory and to dedicate the OSCAR station as well as a new telescope and seismograph.

K2ZRO died 23 Apr. 1984 in Binghamton. (See ASR #76.) Kaz's service to the greater Binghamton/Endicott community was legend. At the Saturday dedication a grateful community articulated a small "thank you."

Among the dignitaries attending the dedication and commemoration ceremonies was Astronaut Commodore Richard Truly who recently flew in the Space Shuttle. AMSAT was represented by Executive Vice President Vern "Rip" Riportella, WA2LQQ.

Over the years K2ZRO had contributed significantly but often anonymously or in subtle ways to the progress of the amateur satellite hobby. The K. Deskur memorial OSCAR station at the Roberson Kopernik Observatory is a fitting tribute, we submit, to a remarkable colleague who we miss deeply.

Late News On BV0 DXpedition

Too late to make the last ASR edition, the following details about a satellite DXpedition to Taiwan, BV0, has been received from JR1SWB.

JH1KRC was to operate AO-10 from Taiwan from 8 June to 18 June using the call BV0JA and BV0YL. QSL address is: DXFF, P.O. Box 12, Shinjukukita-Ochiai, 161, Japan.

WD4FAB To Coordinate Volunteer Activities

Dick Jansson, WD4FAB, has been named to coordinate all AMSAT volunteer activities. He will establish a data base of available talents and another of open tasks. The main

effort will be to effect successful matchups of people with tasks so that jobs get done and people feel satisfied they are contributing to the program.

WD4FAB points out in a letter to key AMSAT managers that in the past too often a prospective volunteer was overlooked or even ignored because the demands of project schedules precluded the requisite training/orientation exercise. Dick will help to smooth the indoctrination and provide "counseling" to those shopping for a good "match".

Interested prospects may reach WD4FAB at 1130 Willowbrook Trail, Maitland, FL 32751 or may call 305-644-9008 at reasonable times.

Short Bursts

- A trio of recent Hamfests has presented AMSAT's best to a host of thousands in the South, the North and the West. N2CF, KO5I and WB5PMR led a strong contingent of dedicated AMSAT volunteers at the Dallas HamCom convention. Promoting the satellite activity was N5AHD, W5IU and NK6K too. The fine team brought in \$1200 for their efforts. Meanwhile VE2VQ led a team at the Rochester HamFest which grossed \$800. KØRZ reports \$900 was raised for AMSAT at the Rocky Mountain Division ARRL Convention over the Memorial Day weekend. Assisting KØRZ were WBØGAI, WBØRLY, WØTT, WBØPSV and WA6ERB. Congratulations to all!

- Stations in Portland OR, Rapid City, SD and Tulsa, OK are urgently needed for a AO-10 emergency communications experiment on either 28, 29, 30 June, 1 July. If you are in one of these QTHs and have AO-10 capability, please contact AMSAT HQ at 301-589-6062 as soon as possible.

- WD4FAB has two excellent articles in the current (June) edition of QST. The first is on thermal design for amateurs and the second is on a 23 cm bandplan. Check them out. Congratulations WD4FAB!

- Ian Ashley, ZL1AOX, has been named Amateur of the Year for 1983 in New Zealand. Ian was cited for his work as an AO-10 telecommand station and for his pioneering work in packet radio. The award was made recently at the annual meeting of NZART, The New Zealand amateur radio society. Congratulations to Ian!

- Hmm. That makes two major awards in year for AMSAT folks: Lyle Johnson, WA7GXD (who we've agreed to share with TAPR-hi) and Ian, ZL1AOX. In prior years W3GEY has been honored by the Central States VHF Society and other awards have been bestowed on numerous AMSAT members. And is anyone wondering why we're so proud to be part of an organization which can attract and motivate talent like this?

- On the satellite DX front, G3IOR reports new stations on include TZ6FE, 9X5HR, VP2EME, VP2ES. Meanwhile ON7HP is up to 97 countries worked. Pat says OX will be on AO-10 soon as well.

- Don't forget to get your envelopes on file at the AMSAT QSL Bureau, 1850 Lisle Ave., Obetz, OH 43207. Our continued thanks to WB8OTH for his superb efforts in this essentially thankless job. Thanks Perry!

Orbit Predictions

By KA9Q

Satellite: rs-5
Catalog number: 12999
Epoch time: 84147.12198177
Sat May 26 02:55:39.224 1984 UTC
Element set: 169
Inclination: 82.9529 deg
RA of node: 155.2656 deg
Eccentricity: 0.0011108
Arg of perigee: 137.6944 deg
Mean anomaly: 222.4971 deg
Mean motion: 12.05045307 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10728
Semi major axis: 8033.876 km
Anom period: 119.497582 min
Apogee: 1674.198 km
Perigee: 1656.350 km

Satellite: rs-8
Catalog number: 12998
Epoch time: 84145.27286685
Thu May 24 06:32:55.695 1984 UTC
Element set: 274
Inclination: 82.9621 deg
RA of node: 158.1641 deg
Eccentricity: 0.0018655
Arg of perigee: 197.1727 deg
Mean anomaly: 162.0721 deg
Mean motion: 12.02946019 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10687
Semi major axis: 8043.226 km
Anom period: 119.706120 min
Apogee: 1681.922 km
Perigee: 1651.913 km

Satellite: rs-3
Catalog number: 12997
Epoch time: 84146.15537273
Fri May 25 03:43:44.203 1984 UTC
Element set: 95
Inclination: 82.9606 deg
RA of node: 145.0645 deg
Eccentricity: 0.0060058
Arg of perigee: 36.9567 deg
Mean anomaly: 323.5616 deg
Mean motion: 12.15586627 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10812
Semi major axis: 7987.332 km
Anom period: 118.461323 min
Apogee: 1664.771 km
Perigee: 1568.830 km

Satellite: rs-6
Catalog number: 13002
Epoch time: 84144.42449493
Wed May 23 10:11:16.361 1984 UTC
Element set: 81
Inclination: 82.9626 deg
RA of node: 148.7570 deg
Eccentricity: 0.0051579
Arg of perigee: 58.5039 deg
Mean anomaly: 302.1055 deg
Mean motion: 12.13561845 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10771
Semi major axis: 7996.220 km
Anom period: 118.658971 min
Apogee: 1674.634 km
Perigee: 1592.146 km

Satellite: oscar-9
Catalog number: 12808
Epoch time: 84155.35502310
Sun Jun 3 08:31:13.995 1984 UTC
Element set: 647
Inclination: 97.5912 deg
RA of node: 129.7084 deg
Eccentricity: 0.0003038
Arg of perigee: 131.7528 deg
Mean anomaly: 228.4027 deg
Mean motion: 15.25824165 rev/day
Decay rate: 4.491e-05 rev/day^2
Epoch rev: 14743
Semi major axis: 6863.414 km
Anom period: 94.375226 min
Apogee: 499.592 km
Perigee: 494.335 km
Beacon: 145.0250 mhz

Satellite: rs-4
Catalog number: 13000
Epoch time: 84148.16656589
Sun May 27 03:59:51.292 1984 UTC
Element set: 198
Inclination: 82.9577 deg
RA of node: 153.2989 deg
Eccentricity: 0.0019552
Arg of perigee: 110.8283 deg
Mean anomaly: 249.4029 deg
Mean motion: 12.06666756 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10755
Semi major axis: 8026.673 km
Anom period: 119.337088 min
Apogee: 1682.622 km
Perigee: 1651.235 km

Satellite: rs-7
Catalog number: 13001
Epoch time: 84148.47530240
Sat May 19 11:24:26.127 1984 UTC
Element set: 156
Inclination: 82.9617 deg
RA of node: 155.4448 deg
Eccentricity: 0.0023603
Arg of perigee: 89.4850 deg
Mean anomaly: 270.8942 deg
Mean motion: 12.08681858 rev/day
Decay rate: 4e-08 rev/day^2
Epoch rev: 10680
Semi major axis: 8017.743 km
Anom period: 119.138050 min
Apogee: 1679.649 km
Perigee: 1641.672 km

Satellite: oscar-10
Catalog number: 14129
Epoch time: 84155.14064979
Sun Jun 3 03:22:32.141 1984 UTC
Element set: 105
Inclination: 25.6378 deg
RA of node: 196.2423 deg
Eccentricity: 0.6089574
Arg of perigee: 276.7795 deg
Mean anomaly: 21.6381 deg
Mean motion: 2.05850652 rev/day
Decay rate: -1.36e-06 rev/day^2
Epoch rev: 732
Semi major axis: 26106.044 km
Anom period: 699.536283 min
Apogee: 35629.315 km
Perigee: 3034.378 km
Beacon: 145.0100 mhz

Amateur Satellite Report is published and mailed First Class bi-weekly for the Radio Amateur Satellite Corporation. The purpose is to enhance communications about the Amateur Radio Satellite Program. Subscription rates for the United States, Canada, and Mexico are \$22.00; Foreign is \$30.00. The rate covers 26 issues (typically one year). Send check or money order in U.S. funds (drawn on U.S. banks only please) to "Satellite Report," 221 Long Swamp Road, Wolcott, CT 06716. Information contained herein may be quoted without permission provided credit is given to Amateur Satellite Report, Wolcott, CT 06716. Amateur Satellite Report is Copyright Protected and duplication of this publication in any way including by the photocopy process or by electronic means (computer data banks, etc.) is not permitted under any circumstances. Amateur Satellite Report is endorsed by the ARRL as the special interest newsletter serving the Amateur Radio Satellite Community. The editorial opinions expressed are not necessarily those of the ARRL.